

OFFICIAL PET USERS' CLUB NEWSLETTER

ISSUE No. 3

Once again, we apologise for the late arrival of this issue, but readers' articles and so on have been slow in appearing. To make up for this, we have included lots of useful information and interesting features.

As you will see, the newsletter has been re-formatted into six sections covering the main aspects of PET and its use as follows:

- Commodore News
- Software
- Peripherals and attachments
- Applications
- Programming
- Users' Directory and Announcements

If you have any articles, letters or just comments for the Users' Club Newsletter, please address them to:

- The Editor
- The Pet Users' Club
- Commodore Systems
- 360 Euston Road
- London NW1 3BL

Details are given in the appropriate sections of what is required and of the prizes offered for good articles.

Commodore News

SUBSCRIPTIONS

After the rather slow start to the Users' Club, we now expect to produce a newsletter every six weeks, giving a total of at least eight issues per year. For simplicity of administration we shall not be asking for renewal of subscription from anyone before 1st May 1979 and from now on are backdating new memberships to the 1st May or 1st November in a particular year.

A SHORT NOTE ON NEW ROMS

As there have been many rumours regarding possible new ROM's for the PET we think that you should be given the official Commodore viewpoint.

1. We are working on a new set of ROM's to overcome the 256 element dimension restriction and possibly to include a machine language monitor.
2. These are not our maximum priority as we feel it only fair to get the Printer and later the Floppy Disc available to our customers first.
3. We therefore do not expect to have the ROM's for sale until early next year. Advance warning will be given in the newsletter and hence nothing can be gained by repeatedly ringing the Commodore office.
4. Some users are experiencing a problem due to regular loss of cursor. This can now be fixed and we suggest that any users concerned should contact their dealer or ourselves if purchased direct.

SPECIAL - READERS OFFER

INTERFACE PACKAGE consisting of:

1. A condensed description of the HP-IB interface bus.
2. Official 6522 PIA specification

available for £2.00 (postal order/cheque to Commodore Business Machines (UK) Limited) plus a large (A4) stamped (18½p) addressed envelope.

Between them, these two excellent booklets should cover all you need to know about the hardware/protocol arrangements for interfacing to your PET. The HP-IB description is produced by Hewlett-Packard and has previously been sold for £2.50. The 6522 manual describes the versatile Peripheral Interface adaptor in complete detail and is produced by MOS Technology.

STOP PRESS

Commodore has just announced that PET's will be manufactured in the UK. Commodore owns a factory in Eaglescliffe (near Stockton-on-Tees) which has previously been used for production of scientific calculators.

Initially, PET's will be built at a rate of 500 per month, rising to 1000 a month towards the end of the year. This means that despite ever increasing demand for PET's, delivery time will be kept down to a reasonable period. PET's will also be supplied to the European market. There will be no change in the retail price.

Software

In this section we shall be dealing with the software available from Commodore for the PET. Our Master Library contains professionally written, well documented programs which have been tried and tested prior to release. The Common Library consists of programs written by PET Users for sale at very low cost.

We shall also be reviewing the latest programs in some detail and be making some general comments about obtaining software for your PET.

COMMON LIBRARY

Below is a list of all the programs currently available from the Common Library. If you would like to submit a program that you have written please note the following:

1. Programs submitted should be on cassette - we regret that we cannot return them, so please keep a copy.
2. All programs should be "Self-documenting" as we do not supply booklets with these programs.
3. Submissions should be sent to the Software Manager at Commodore. Please include your name and address.
4. For every accepted program we will send out four free Common Library programs of your choice.

The list is as follows:

PROGRAM NUMBER	NAME	AUTHOR	DESCRIPTION
CL001	ESP TEST	Mr. Chambers	Tests ability to 'perceive' random numbers
CL002	SLOT MACHINE	"	
CL003	MASTERMIND	Mr. McDonald	
CL004	MOO	Prof. A. Colin	Guess numbers against computer
CL005	LIFE	Mr. Wheatcroft	
CL006	STARWARS	Dr. Lucas	Based on a raid on 'Death Star'
CL007	ONE ARM BANDIT	A. M. Robertson	Good graphics
CL008	DEEPSPACER	D. A. Allen	Space game
CL009	SOLVING SIMULTANEOUS EQUATIONS	Prof. A. Colin	Up to 16 variables
CL010	MEMORY DISPLAY IN HEX	Mr. Tribe	

All the following are new this issue:

CL011	CAR MAZE	Unknown	Allows you to drive a vehicle through a random maze
CL012	BOXES	Unknown	A version of the children's game "squares". You play against the computer
CL013	GOLF	M. J. Lake	Reasonable graphics. You choose your handicap, confess your weaknesses
CL014	CONCENTRATION	F. T. Chambers	Computer implementation of Pelmanism type card game
CL015	21 CARD TRICK	L. M. Gold	Computer implementation of traditional party game
CL016	PATIENCE	X. Houching	Known in US as Solitaire
CL017	SOLITAIRE	J. R. Park	Traditional European board game
CL018	DARTS	E. Bloomfield	Workmanlike simulation of famous game
CL019	CRAPS	Prof. A. Collin	The Dice Game
CL020	TANK	C. Tuppen	Original tank battle game

CLØ21	U BOAT	D. Langford	A nice graphic. You sink ships
CLØ22	BOMB DROP	B. P. O'Hare	Aim your bomb to hit a target
CLØ23	ROBOT CHASE	O. F. Bulmer	Defend yourself with mine-fields as robots close in to wipe you out.
CLØ24	K-SCOPE	B. P. O'Hare	Produces kaleidoscope patterns
CLØ25	WIDGETS	Dr. R. Botting	Factory economics simulation
CLØ26	SPECULATION	C. Ryan	Stock market simulation
CLØ27	LIFE (machine code)	M. Taylor	Conway's Life game (taken from Micro Journal. Screen crackle suppressed)
CLØ28	TIMES TABLE	W. Lyons	Teach your children the rudiments
CLØ29	BASE CONVERSION	R. C. Gentry	Converts a number of any base to a number of any other base
CLØ3Ø	NON-PARAMETRIC STATISTICS	P. Harper	Mann-Whitney & Spearman tests
CLØ31	DISPLAY F(X)	C Tuppen	High resolution graphic plotter
CLØ32	3D PLOT	A. Picken & C. Bullock	Attempts to display functions of two variables

To order Common Library programs, please quote Program Number and Name.

Minimum Order - 4 programs - £5.00

Each additional program - £1.25

Prices include VAT and P+P

Cheques made to: Commodore Business Machines (UK) Limited

Please send orders to:

Commodore Systems
360 Euston Road
London NW1 3BL

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MASTER LIBRARY

The following is a list of the new additions to the Master Library for release in October. You should also have received a price list with this issue which has details of the other programs available from the Master Library.

Business Programs

All of these programmes are accompanied by documentation.

MP021	BASIC PAYROLL	£25	Two programs on separate tapes: one to create a file on employees; the other to process the data files. (Applies to UK only) Requires one or two cassettes.
MP022	BASIC STOCK CONTROL Rockstock	£20	A dealer written 2 cassette stock control program. Handles unlimited number of products.
MP023	Ardenstock	£15	A dealer written 1 cassette stock control program. Handles 90 products and will record any period of issues and receipts.
MP024	DATA BASE UTILITY	£15	A file handling utility to help you run your business. Requires two cassette decks. Creates, maintains and examines files.
MP025	COSTING	£10	Cost report generating program - see the effect of cost changes on total system and sub system costs. Uses one cassette.

Other Documented Programs

MP026	SNARK	£12	Teaches assembly language of 16 bit abstract machine
MP027	SURVEY ANALYSIS	£8	Analyses response to questionnaires
MP028	ACLOCK	£6	Sets PET up as an alarm clock. Includes details of interfacing to 8 bit user port for audible warning.

Mathematical

MP029	LEAST SQUARES	£3	Fit a curve to any set of data points.
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NOTE: We regret that the release of the Basic Maths. and Stats. packs has been delayed until October and will not be available in September as stated on the price list.

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SOFTWARE TESTING

To ensure that the programs marketed in our Master Library are reliable and bug free, we arrange that all programs are thoroughly pre-tested by a number of independent users.

We are on the look-out for more testers with specialist interests and are prepared to give free copies of the pre-release software for evaluation. If you are interested in being a software tester, please write to the Software Manager at Commodore, enclosing details of any specialist interests.

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SOFTWARE WANTED

We are still looking for professional programs for our Master Library in the following fields:

SCIENTIFIC	MATHEMATICAL	ENGINEERING
BUSINESS	FINANCE	
USEFUL SIMULATIONS AND MODELS		

If you have experience in these or similar areas, please contact our Software Manager for details of royalties and arrangements. With Commodore, you could end up selling to the world.

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PROGRAM FEATURES

Payroll

Some good news on the software front is the appearance of a long-awaited professional payroll system. The programs have been written by a practising Chartered Accountant who has considerable experience in computer payroll applications. In addition to the payroll function, to compute wages and National Insurance each week, there is a 'create' program to set up a file on all employees; a 'change' program to make any changes; a 'duplicate' program to make extra copies for security; and a 'copy' program to reset the tax paid, etc, at the end of the year.

This entire suite of programs is available for £25 complete with documentation. For an additional £10 per year, the author will send new updated programs each time there is a tax or other change - this is to be recommended.

The programs come in two forms. The version to operate with two cassette recorders can cope with the following:

1. Monthly, weekly or hourly paid staff
2. 3 overtime rates per employee
3. Hourly based bonus
4. Short time (unpaid leave)
5. Non-taxable expenses
6. Staff loans
7. Unlimited number of employees - we recommend a strategic maximum of 100 for speed and safety.

The other version, also supplied, works with just the internal cassette deck. Although it does not have the versatility of the two cassette system the following items can be used:

1. Monthly or weekly paid staff
2. 2 overtime rates per employee
3. Short time (unpaid leave)
4. Staff loans
5. 10 employees per file (unlimited number of files)

Both series of programs cope with A, B and C National Insurance Rates and all tax codings. These are calculated and summed each week. The programs have built-in provision for use with a printer if the user has access to one.

Altogether the system is thoroughly professional in its design and use, and should more than satisfy the many requests for computerised payroll.

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Costing

The new "Costing" program suite allows a file to be created containing up to 200 descriptions and costs. The file can subsequently be altered by adding new records or changing existing ones.

A special two part coding system allows not only the grand total of the records in the file to be calculated, but also up to 20 sub totals based on the code will be calculated. The second part of the coding system allows for another 20 sub totals to be used independently of the first ones.

One of the features of the system is the sophisticated file editing system, which makes it very easy for the user to specify the changes he wishes to make. Once the initial file set up has been performed, only one program is required to edit, add and delete records and print out the various totals available.

This system is well documented and should be readily understood by the most inexperienced users.

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TEACHERS' PET?

We are pleased to announce that we have secured the agreement of the Project Director - Bob Lewis - for teachers using Chelsea Science Simulation Project programs and Schools Council Project packages to freely adapt these programs to suit the PET.

Teachers who would like to get involved in this scheme are invited to contact Commodore's Software Manager.

We will be talking to Edward Arnold, publisher of the support documentation, soon about appropriate changes to the documentation of their programs.

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A PLEA FOR HELP!

We have programs entitled "BOXES" and "CAR MAZE" - but we have no note of who the authors are. Any ideas?

Peripherals & Attatchments

In this section we shall be reviewing the various peripherals (both Commodore's and others) that can be readily coupled to the PET. We shall also be giving details of small home-built circuits such as A/D convertors and audio-outputs to increase the versatility of your system.

If you have linked your PET to another piece of equipment and can send us details of the hardware and software used, we would be pleased to publish them.

PRINTERS

Many people are wondering when the Commodore printer will be available. It is true to say that it has been delayed from the original intended launch date, but this has enabled us to improve the design and increase the specification to include a programmable character.

The first few samples are due to be shipped next month but there is already a considerable backlog of orders to fulfil. Printers are not likely to be available 'over the counter' until much later in the year.

The good news is that we now know a lot more about the printer and it certainly seems that it's going to be worth waiting for!

Specification of the Commodore 2020 Printer

Print width:	80 characters (or 40 if using the built-in double width character set)
Stationery:	Rolls or individual sheets up to 8½" wide. Can thus print on pre-printed invoices, etc.
Copies:	At least 2 carbon copies possible
Print Head:	8 x 7 matrix impact printer
Character Set:	Full upper and lower case, double width and complete PET graphics
Print Speed:	Average 50 characters per second Bursts at 150 characters per second
Formatting:	Excellent FORTRAN like formatting, such as number of decimal places and right justification
Special Feature:	The 2020 printer can print one programmable character which is designed by the user and can be changed at will during a program. This makes possible a "f" sign, company logo's, and specialist symbols for circuit diagrams, etc.

OTHER PRINTERS

For those of you who cannot wait for our printer or are prepared to pay more for extras such as an inbuilt keyboard or 120 column width, we are here printing details of a number of independent models currently available.

It should be understood that we are neither specifically recommending these printers nor vouching for the validity of the statements coming from the manufacturers. All the ones here, however, have been seen in operation with a PET.

Some PET functions, such as lower case, tabulation and graphics will not be available on all these machines.

1. CENTRONICS

This company (which is one of the best known names in the printer business) has recently announced a new Centronics/IEEE-488 interface which enables many of their printers to be coupled to the PET. The present range is as follows:

<u>Model</u>	<u>Description</u>	<u>PET Compatible Price</u>
Micro-P1	Electrostatic	£435 + VAT
779	Impact	£955 + VAT
701	"	£1468 + VAT
702	"	£1731 + VAT

For full details of these machines and up to date information on delivery, contact:

Mr. Alistair Watt
Millhouse Designs
Noar Hill
Selbourne
Alton
Hampshire

Tel: 042050-374
Tlx: 262284-R3038

2. TELETYPE

The Teletype Model 43 from Peripheral Hardware has been established in the computer market for some time now. This model is now available PET compatible in two forms:

1. Model 43 including built-in unidirectional interface for printing only: £975 + VAT
Delivery ex-stock
2. Model 43 including external bi-directional interface for using onboard keyboard as an input to the PET: £1080 + VAT
Delivery 3 - 4 weeks

Enquiries/orders to: Peripheral Hardware Limited
Link House
Pool Close
West Molesey
Surrey Tel: (01) 941 4806

or your local PET dealer

3. AXIOM

The Axiom EX-801 Microprinter is a 120 lines/minute electro-sensitive printer. It can be programmed for 20, 40 or 80 column width with full upper and lower case and reverse field. The print head is self-adjusting and the printer is micro-processor controlled.

The 801 is available PET compatible for £499 with delivery in under one week from:

Memec Systems Limited
Thame Park Industrial Estate
Thame
Oxon Tel: 084 421 3149

SPECIAL FEATURE : LOW BUDGET PRINTING

Since many users require a print-out purely for recording results of programs and to produce listings, we have been scanning the market for a low cost printer to make known to our users.

One such printer is the SWTPc PR-40 which is available ready made for £250 + VAT. In an attempt to eliminate expensive or time consuming circuits for interfacing this printer, we have developed a subroutine for driving this (or any other 8-bit parallel input device) from the PET's 8-bit User Port.

The procedure for using this subroutine is neither elegant nor fast, but it is reasonably efficient and easy to use. First, insert the following subroutine (suitably re-numbered if desired) into your program:

```
1010 POKE59459,255: S=32768
1020 POKE59467,PEEK(59467)AND227
1030 POKE59471,13: GOSUB1090
1040 FORW=1TO1000: NEXT
1050 FORA=STOS+39: C=PEEK(A)
1060 IFC<32THENC=C+64: IFS>33767THENEND
1070 POKE59471,C: GOSUB1090
1080 NEXT: S=S+40: GOTO1030
1090 POKE59468,PEEK(59468)AND31OR192
1100 POKE59468,PEEK(59468)OR224: RETURN
```

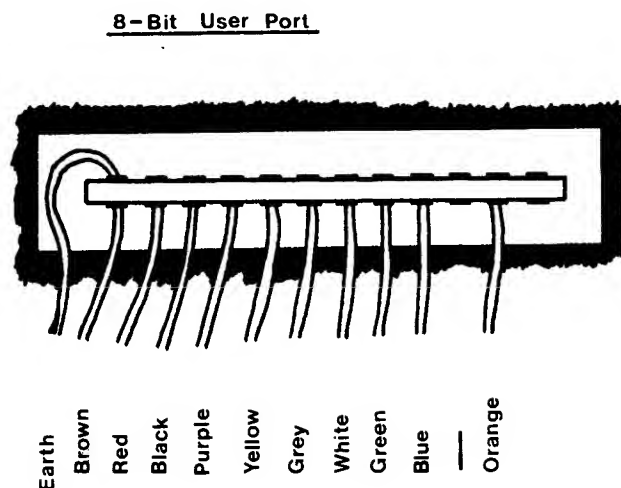
Then proceed as follows:

1. Print the desired results or listings onto the screen (a page at a time if too long for one screenfull).
2. GOSUB to the print subroutine.
3. Continue with operation of program or next page of listing/results.

The PR-40 printer takes standard 4" roll paper and will print the standard 64 character ASCII set up to 40 characters wide.

It is currently available on 4 - 5 weeks' delivery and we understand that, if specifically requested, SWTPc will put a PET-type edge connector on their printer to plug straight into the PET. If you require this, please specify PR-40-P on ordering.

For those of you who already have access to a PR-40 or wish to buy one in kit form (£200 + VAT) the following diagram indicates the wiring positions:



LOOKING AT THE BACK OF THE PET

All queries regarding the PR-40 should be addressed to:

Computer Workshop
38 Dover Street
London W1X 3RB

Tel: (01) 491 7507

STOP PRESS

We understand that one of the PET dealers - TAYLOR WILSON SYSTEMS LIMITED - is in the process of forming a new company to manufacture interfaces and attachments for the PET. First off the line is an interface to drive an additional V.D.U. The box has two output sockets - one for a standard Monitor - and one for a domestic T.V. set. The self-contained mains powered unit plugs straight onto the 8-bit User Port and has a variable line-hold to adjust to your particular T.V.

Price for the ready assembled unit is £75 including VAT with delivery late September onwards.

Also under development are a single and twin drive mini-floppy disc for the PET. Although we have not yet seen a prototype, Taylor-Wilson say they hope to start production by the end of October. The drive to be used is the PERTEC FD200 and each single sided disc will have a capacity of 125K bytes (80K usable). Prices are to be as follows:

Single Drive	-	£870 + VAT
Dual Drive	-	£1300 + VAT

Enquiries should be addressed to:

Mr. Peter New
Taylor Wilson Systems Limited
Oakfield House
Station Road
Dorridge
Solihull
West Midlands
B93 8HQ

Tel: 05645-6192

Memory Expansion for your PET

Recently announced by IJJ Design Limited has been a set of Memory expansion boards for plugging into the PET. Although we have not yet seen the board, we understand that it is available in three versions as follows:

PME1-16	(16 K bytes)	£328 + VAT
PME1-24	(24 K bytes)	£388 + VAT
PME1-32	(32 K bytes)	£438 + VAT

Note: The 32K byte add-on brings the PET memory up to a total of 40K bytes. The top 8K however is then "reserved" and must be used for machine code programs or storing data/graphics.

These prices include post and packing and also a program on tape for testing all memory locations and showing diagrammatically the position of any faulty chips.

The board fits inside the PET and is powered from PET's own power supply - all you need is a small screwdriver to install it. IJJ Design say they hope to deliver by return of post upon receipt of payment.

Orders/Enquiries to: IJJ Design Limited
37 London Road
Marlborough
Wiltshire
SN8 2AA

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Lotus Sound, 4 Morgan Street, London E3 5AB, informs us that they are stocking expansion memory, software, dustcovers, work books and musicbox accessories. We understand that further details can be obtained by sending a stamped addressed envelope.

Applications

There are almost as many applications for a PET as there are PET's themselves. We would like to find out what the PET is being used for so that we can pass on relevant details to other people interested in the same area of use.

We are thus offering £25 worth of free Master Library software to the best 'Applications' article published in each issue. If you would like to write about what you are doing with your PET please include the following details:

1. What the nature of the application is.
2. What (if applicable) non-computerised system has the PET replaced.
3. Details of any extra hardware used.
4. Any "special features" of the programs used.
5. Who else this system might be useful to.
6. Any further improvements/modifications intended.

We already know of many applications and intended applications but we would like to see details and know who to contact. The following list contains just some of the uses for PET that have reached our ears.

Monitoring chemical reactions	Address lists
Parts explosion	Aircraft flight simulation
Questionnaire analysis	Medical record storing
Music synthesising	Model railway control
Machine tool control	Costing
Perception tests (psychology)	Astral navigation
Currency conversion	Language teaching
Word processing	School administration
PCB testing	Stock control

Are any of these familiar to you?

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Programming

This section will be dealing with useful routines and "tricks" for using on your PET. Some articles come from users, some from ourselves, and there is a 'Hints and Tips' section for smaller items.

To start off, here is an excellent article from Mike Stone explaining how to merge programs together.

Programme Overlays on a PET

1. The 8K core of a PET is not usually a limitation in the home computer and hobbyist world, nor even in an educational environment where students are just creating small exercise programs. With the devices now available for attachment - the second cassette, the printer, and floppy discs shortly - the PET becomes a valid and genuine data processing machine, and complex string handling programs with files may well run out of space.
2. Programmers with experience on other computers know that one answer to this kind of problem is to break the program down into segments, so that only part of it is occupying memory at any time, and all or part is "overlaid" by other segments as required. When the program segments are on a disc, direct access features normally permit great flexibility, in that any required segment can be loaded; for tape only systems, the segments have to be arranged in order of need - e.g. job initialisation, main coding, and termination segments.

3. Since PET's BASIC includes a LOAD instruction to acquire dynamically a new program from tape, and (provided the new program is no longer than the one issuing the LOAD) all data areas remain available to the loaded program, the basis exists for an overlay system. However, for true overlaying, it is essential that some of the original program (e.g. control of the program flow, common subroutines, etc.) be retained throughout, whatever new segments are loaded. PET does not do this automatically; this paper tells you how to do it.
4. PET stores BASIC programs in location 1024 upwards, in the format for each instruction shown in Newsletter No. 0 page 4. Note that the pointers, and line numbers, are pairs of bytes giving low/high. The high must be multiplied by 256 and added to the low to give the actual quantity.
5. Whenever a line of code is entered from the keyboard, PET moves every statement around as necessary and re-adjusts all the chaining, so that statements are always stored in strict sequence of line number.
6. When your program contains a LOAD statement, this does NOT imply either CLR or NEW. The new program is simply loaded in at (and then executed from) location 1024, for as much space as it needs. The new program does NOT (as with some BASIC's) just replace those statements with identical line numbers; it is strictly a new program in its own right. However, any program statements at the end of the LOADING program whose space is not required by the LOADED program do remain unscathed by the LOAD. The problem is that the new program has no (forward-) chain into them, so PET knows nothing about them.

7. It follows from the above that if we code the instructions-to-be-preserved with high line numbers; and if the space needed by the newly-loaded segment does not over-write them; and if we can force the new segment to chain into the old instructions; then we have a real overlay system. So, if during the original program you can find in memory the last statement not to be preserved, you know it forward chains into the next highest line number, i.e. the first of the statements you do want preserved. Then when the overlay arrives, you need only find its very last statement and replace its forward-chain by the one you previously found, and both new and old code form a contiguous program.

8. A very simple illustration follows

Enter this program (do NOT put any spaces, except after line numbers):

```

100  A=A+1
200  GOSUB500
300  LOAD"NEWPROG"
500  PRINTA*2
55   RETURN

```

This is stored as follows ("PEEK" values):

```

1024)    0
      5)   11      } forward chain; 4 x 256 = 1024 + 11 = 1035
      6)    4      }
      7)   10      } line number 10
      8)    0      }
      9)   65      A
1030)  178      =
      1)   65      A
      2)  170      +
      3)   49      1

```

```

4)      0
→ 5)    19      } forward chain; 4 x 256 = 1024 + 19 = 1043
6)      4      }
7)    20      } line number 20
8)      0      }
9)    141      GOSUB
1040)   53      5
1)     48      0
2)      0
→ 3)    34      } forward chain; 4 x 256 = 1024 + 34 = 1058
4)      4      }
5)    30      } line number 30
6)      0      }
7)    147      LOAD
8)     34      "
9)     78      N
1050)   69      E
1)     87      W
2)     80      P
3)     82      R
4)     79      O
5)     71      G
6)     34      "
7)      0
→ 8)    43      } forward chain; 4 x 256 = 1024 + 43 = 1067
9)      4      }
1060)   50      } line number 50
1)      0      }
2)    153      PRINT
3)     65      A
4)    172      *
5)     50      2
6)      0
7)     49      } forward chain; 4 x 256 = 1024 + 49 = 1073
8)      4      }
9)     55      } line number 55
1070)   0      }
1)    142      RETURN
2)      0
→ 3)      0

```

If we want lines 50 and 55 to be available to an overlay, the important information is the forward chain in line 30, i.e. locations 1043 and 1044.

9. To see how it works, SAVE"PROG" and leave the cassette Record and Play keys down.

Enter NEW; then the following (again, no spaces):

```
5    A=A*2
10   GOSUB50
15   STOP
```

LIST if you like, to confirm that there are no lines 50 and 55.

SAVE"NEWPROG".

Now rewind your tape, and press RUN.

PROG will be loaded, will print "2", and continue up the tape. When NEWPROG has been loaded, you will get

```
?UNDEF'D STATEMENT ERROR IN 10
```

That is because the overlay looks like this:

```
1024) 0
      5) 11      } forward chain to 1035
      6) 4       }
      7) 5       } line number 5
      8) 0       }
      9) 65      A
1030) 178      =
      1) 65      A
      2) 172     *
      3) 50      2
      4) 0
→ 5) 19      } forward chain to 1043
      6) 4      }
      7) 10     } line number 10
      8) 0      }
      9) 141    GOSUB
1040) 53      5
```



```

1)    48                0
2)    0
→ 3)   25      } forward chain to 1049
4)    4      }
5)   15      } line number 15
6)    0      }
7)  144                STOP
8)    0
→ 9)    0

```

10. The last line, 15, does not chain into the old line 50. But that line 50 is still there, in location 1058 et seq. So, do this:

```

POKE 1043,34
POKE 1044, 4

```

LIST - and behold, NEWPROG now includes lines 50 and 55!

You can RUN if you like, to prove it.

What we have done is to use what we discovered about the first program (last sentence of paragraph 9) to modify the second program.

11. How do you program all this to happen automatically? It is not at all difficult. Let us assume that the statements-to-be-preserved are at lines 5000 and upwards. So, just before that, code this (NO SPACES):

```

4997  N1=PEEK(201)    Get (low) address of line 4998
4998  N2=PEEK(202)    Get (high) address of line 4999
4999  RETURN
5000  ....  ....

```

(Locations 201, 202 always contain, during instruction execution, the address of the next instruction - strictly, the "Ø" between instructions.)

12. Now, just before your program wants to load in the overlay program, code this (spaces if you like!):

```
850  GOSUB 4997
860  N1 = N1 + 14           Low address of 4999 (the length
                           of 4998 is 14 bytes)
870  N2 = N2 * 256         Actual high address of 4999
880  If N1 < 256 THEN 900   Adjust low for page boundary
890  N1 = N1 - 256
900  BC = N1 + N2 + 1       BC is now actual machine address
                           of line 4999
910  Z1 = PEEK(BC):Z2=PEEK(BC+1) Hold the forward-chain
                           locations out of 4999
920  LOAD "NEWPROG"
```

13. As the first instructions of NEWPROG, the chain-adjusting must be done. The necessary code is very similar:

At the end of NEWPROG, as the very last statements, code (NO spaces):

```
3997      N1=PEEK(201)
3998      N2=PEEK(202)
3999      RETURN
```

And at the beginning code:

```
10      GOSUB3997
20      N1=N1+14
30      N2=N2*256
40      IF N1<256 THEN 60
50      N1=N1-256
60      BC=N1+N2+1       BC is now actual machine
                           address of 3999
70      POKE BC,Z1:POKE BC+1,Z2
```


14. It is worth just reiterating that the total size of the incoming overlay (irrespective of line numbers; just its size in bytes occupied) must be less than the total size of the instructions being overlaid.

Mike Stone

ABBREVIATING BASIC WORDS

As explained in the instruction manual, any BASIC word takes up 1 byte of memory storage space. It has been stated that the word "PRINT" can be abbreviated to "?" which saves time on entering programs. When listed, the word is expanded to its full form. Both forms take 1 byte per word.

We now have information on how to abbreviate the complete list of BASIC words. The algorithm to remember is as follows:

1. For any BASIC word, type in the first letter of the word (e.g. V for VERIFY).
2. Hold down the 'Shift' key and type in the second letter. If you are in graphics mode, this will appear as a graphic character (e.g.  for E). It is a good idea to go into lower case mode as the two letters are then easy to read.

In some cases, this two-letter method gives a possibility of more than one BASIC word (e.g. READ and RESTORE). For one of the words (usually the longer) it will be necessary to type the first two letters and the shifted third. All these abbreviations are converted to full words upon the command LIST.

Below is a complete list of the words and abbreviations:

<u>BASIC</u>	<u>ABBREV</u>	<u>BASIC</u>	<u>ABBREV</u>	<u>BASIC</u>	<u>ABBREV</u>
LET	Le	DEF	De	RUN	Ru
READ	Re	RETURN	REt	CLR	Cl
PRINT	?	STOP	St	LIST	Li
PRINT#	Pr	STEP	STe	CONT	Co
DATA	Da	INPUT#	In	FRE	Fr
THEN	Th	SGN	Sg	TAB (Ta
FOR	Fo	ABS	Ab	SPC (Sp
NEXT	Ne	SQR	Sq	PEEK	Pe
DIM	Di	RND	Rn	POKE	Po
END	En	SIN	Si	USR	Us
GOTO	Go	ATN	At	SYS	Sy
RESTORE	REs	EXP	Ex	WAIT	Wa
GET	Ge	AND	An	LEFT\$	LEf
GOSUB	GOs	NOT	No	RIGHT\$	Ri
OPEN	Op	VAL	Va	MID\$	Mi
CLOSE	CLo	ASC	As	CHR\$	Ch
SAVE	Sa	CMD	Cm	STR\$	STr
LOAD	Lo	VERIFY	Ve		

SIMULATING A CALCULATOR ON YOUR PET

Many users have asked whether the PET can do live calculations. Although a simple sum such as 2 + 3 can be performed thus:

```
PRINT 2 + 3 'RETURN'
```

it would be more convenient if the operation of a calculator could be simulated directly. The following program should give you an idea of how this can be achieved:

```

5 REM    GRAPHICS
10 PRINT"["
20 PRINT"
25 PRINT"
30 PRINT"
40 FORI=1TO19
50 PRINT"
60 NEXT
1000 REM  CONTROLLER / INPUT
1010 GETA$: IFA$="" GOTO1010
1020 A=ASC(A$)
1030 IFA>57 THEN4000
1040 IFAC48ANDAC>46 THEN2000
1050 IF T=1 THENX$="":T=0
1055 IFLEN(X$)=9 THEND$="ERROR" " :GOSUB5115:T=1:GOTO1000
1060 X$=X$+A$:X=VAL(X$):GOSUB5020
1070 GOTO1000
2000 REM OPERATORS
2010 IFAC48ORA=44 THEND$="ERROR" " :GOSUB5115:CLR:GOTO1000
2020 IFA=48 THENN=N+1:B(N)=X:X=0:Y=0:O$(N)=0$:O$="" :T=1:GOSUB5000 :GOTO1000
2030 IF0$="*" THENX=X*Y
2040 IF0$="/" THENX=Y/X
2050 IF0$="+" THENX=X+Y
2060 IF0$="-" THENX=Y-X
2065 Y=X:O$=A$:T=1
2070 IFA=41 THENY=B(N):O$=O$(N):N=N-1:T=0
2080 GOSUB5000:GOTO1000
4000 IFA$="S" THENX=SIN(X)
4010 IFA$="C" THENX=COS(X)
4020 IFA$="T" THENX=TAN(X)
4030 IFA$="L" THENX=LOG(X)
4040 IFA$="E" THENX=EXP(X)
4042 IFA$=" " GOTO2030
4043 IFA$="=" THENCLR:T=1
4045 GOSUB5000
4050 GOTO1000
5000 REM DISPLAY
5010 X$=STR$(X)
5020 D$=RIGHT$(" "+X$,11)+" "
5030 IFX<999999999ANDX>.01GOTO5115
5040 IFX=0GOTO5115
5050 IFABS(X)>1E38ORABS(X)<1E-38 THEND$="ERROR" " :GOTO5115
5100 R$=RIGHT$(" "+X$,15)
5110 D$=LEFT$(R$,11)+" "+RIGHT$(R$,3)
5115 PRINT"#####"D$
5120 RETURN
READY.

```

{ "home" 2x "CURSOR DOWN" 12x "CURSOR RIGHT" }

Although the program is by no means perfected, the framework exists for a versatile program. Lines 4000 onwards determine the functions so that when 'S' is pressed the sine of the number on display is calculated and to clear all registers '+' is pressed. The normal operation for +, -, x and ÷ is the same as a straightforward calculator, and there are multiple sets of brackets.

This idea could be used to simulate actual models - including programmable calculators, thus giving access to a wide range of ready-written low key software. We would like to hear from any user who succeeds in doing this.

BITS AND PIECES

Some more hints and tips to help you write efficient programs:

When writing REMark statements, graphics and lower case can be included if they are put inside inverted comma's. This enables separating lines such as:

```
10  REM "_____"
```

```
*      *      *      *      *      *      *      *      *      *
```

When using subscripted variables such as A(4) the operating system automatically reserves 10 elements without having to declare a dimension with DIM. If, however, you are using a very long program and are using less than 10 elements per variable - say 4 - it will save space to declare the dimension's length. For example:

```
10  DIM A(4), C$(3)
```

```
*      *      *      *      *      *      *      *      *      *
```

To display a number (N) to D decimal places, use the following routine:

```
10 M = INT(N*10↑D+0.5)/10↑D
```

```
20 PRINT M
```

```
* * * * *
```

For an intriguing display of graphics, try running this one line program entitled "BURROW"

```
1 A$="↑↓→←":PRINTMID$(A$,RND(.5)*4+1,1)"*←";:FORT=1TO30:  
NEXT:PRINT"↻←";:GOTO1
```

```
* * * * *
```

Important notice for all nocturnal PET Users.

According to Mr. John Collins (PET User Extraordinaire), there occurs a fluctuation in mains electricity in the London area at 3.30 IN THE MORNING!!

He says that this has resulted in cursor loss.

This is the only reported case - but then most of us need our beauty sleep.

```
* * * * *
```

When trying to get the maximum number of characters onto a line of BASIC, it can be frustrating to find that the last character (80th) cannot be entered since the cursor will then move onto the next line. However, it is possible to "push" a character, by inserting, along the line to this end position.

RETAIL PRICE LIST AUGUST 1978

PET MEMORY

An internally mounting memory expansion board is available in two configurations: 24576 bytes (24K) and 32768 bytes (32K).

Installation of the memory board is extremely simple. The board mounts on spacers which screw into the main PET board in place of the existing self tapping screws. A jumper cable is provided to connect to the PET transformer and the board is fitted with a ribbon cable assembly and plug for the PET memory expansion port.

Each memory board is supplied with full installation instructions and a listing of a thorough memory diagnostic program.

<u>Size</u>	<u>Price</u>	<u>20 up less 12%</u>
24K	NEW LOWER PRICES ON APPLICATION	
32K		

Delivery: 10 days - 2 weeks

IEEE/RS232C SERIAL INTERFACE 'A'

This is a unidirectional interface suitable for any printer or serial device requiring V24/RS232C or current loop signals. The interface may be used with up to 15 other devices simultaneously connected to the IEEE bus. The unit contains special formatting circuitry for converting PET codes to ASCII. The unit is normally supplied wired for LISTEN address 4.

The interface is supplied complete with power supply and is housed in a small instrument case. A cable and edge connector are provided for the PET. Connection to the serial device is via a standard 25 way D-type connector.

Baud rates of 110, 300, 600, 1200 are selectable by means of a D.I.L. switch. Stop bits are also switch selectable. The unit is normally set to give even parity. All baud rate timing is crystal controlled.

Price: £106 Delivery: 21 - 40 days

SERIAL INTERFACE 'B'

This is a sophisticated bidirectional interface with full listener and talker address decoding. This unit may be used where remote input is also required. Other specifications as for interface 'A'.

Both interface 'A' and 'B' are supplied with full operating instructions including sample programs for IEEE input and output..

Price: £186.67 Delivery: 6 - 8 weeks

TERMS

All prices ex. VAT at 8%. All orders must be CWO. Cheques should be made payable to R. Bailey Associates. Orders for interfaces should include £2.50 p&p per unit. All goods supplied under 90 day warranty.

Users' Directory & Announcements

One of the major advantages in being a member of the Pet Users' Club is the ability to get hold of PET related software and ideas. Although the Common Library of programs is now flourishing, we get frequent requests for names of people who have written software for a specific application.

We have therefore decided to publish, in each issue, a current User's Directory, containing lists of people writing software, importing literature or starting local PET Groups. If, as we expect, there is a large response to this idea, we will have to publish names and addresses on a first-come-first-served cyclical basis. If someone is offering the kind of service you require in the list, then please contact them - not Commodore. To print more official company advertisements, please write to the Editor, Pet Users' Club, at the address below.

To include your name in the User's Directory, please complete the following form:

To: The Editor, Pet Users' Club, Commodore Systems,
360 Euston Road, London NW1 3BL

NAME

Address

.....

Services Offered/Specialist area of interest:

.....

To include as many contacts as possible, we must restrict each User to only one line of description.

Commodore reserves the right to edit or withdraw any entry.

Until we can get the first list compiled (entries for next issue by 20th October, please) here are a few announcements:

The NORTH LONDON HOBBY COMPUTER CLUB will be holding its inaugural meeting on Wednesday 4th October. In future meetings there will be lectures from qualified members of staff, access to the largest UK library of computer journals, and "homebrew" hardware sessions in laboratories. The Club has access to three PET's and four other systems and a good range of business, scientific and games software.

For further information, contact:

Mr. Robin Bradbeer
Senior Lecturer
Electronics and Communications Engineering Department
Polytechnic of North London
Holloway Road
London N7 8DD

* * * * *

PETALECT Limited of 33 Portugal Road, Woking Surrey, have just announced a service contract for the PET at £69.50 per annum. The details are as follows:

- * contract available to customers within 40 miles' radius of Woking
- * servicing within 24 hours of call
- * all labour and spare parts (except RAM chips) included.

For further details contact Mr. Peter Watts on Woking 69032/68497.

* * * * *

The publication 'COMPUTABITS' mentioned in our previous newsletter has now merged to become part of the new magazine 'PRACTICAL COMPUTING' which is available through good newsagents across the country.

* * * * *

UNITED CARR Limited, 112 Station Road, Ilkeston, Derby, advises us that it can supply 'CINCH' type edge connectors for attaching equipment to the various PET input/output ports. For further information, ring 0602-328711

* * * * *

DUNCAN LANGFORD hopes to be able to import the excellent range of TIS manuals for the PET in the near future. Although there are still many arrangements to be made, interested parties should write to him at: Tye House, Elmstead, Colchester

* * * * *

Anyone interested in attending training courses in use of the PET and BASIC should contact Mr. Nick Hampshire at Computabits Limited, 41 Vincent Street, Yeovil, Somerset - telephone 0935 26522

* * * * *

PLEASE NOTE: In publishing these details, Commodore is not making specific recommendations, and accepts no responsibility for the validity of statements made.

LETTERS TO THE USERS' CLUB

MARK TAYLOR has written to us with the following three interesting points:

1. If you are plagued by snow on the screen during POKE operations to the screen RAM or with machine code programmes, then if in BASIC location 59409 is POKEd with 52 then that will inhibit the character generator. Any transfer operations can then be carried out with the screen totally blank. To restore normal operation the above location should be POKEd with 60. For machine code programmes then LDA 52 & STA ABSOLUTE the above location will be somewhat faster.

The attached listing is a snowless version of "Life".

```
100 READL
110 READA$:C=LEN(A$):IFA$="#"THENEND
120 IF C<10RC2THEN200
130 A=ASC(A$)-48:B=ASC(RIGHT$(A$,1))-48
140 N=B+7*(B/9)-(C=2)*(16*(A+7*(A/9)))
150 IFN<0ORND255THEN200
160 POKEL,N:L=L+1:GOTO110
200 PRINT"BYTE"L="[A$]" ???":END
300 DATA6400
310 DATA20,30,19,20,8A,19,20,E6,19,20,00,1A,A9,34,8D,11,E8
320 DATA20,70,19,A9,3C,8D,11,E8,A9,FF,CD,12,E8,F0,E6,4C,8B,C3,AA,68,28,4C,8B,C3
330 DATA EA,EA,EA,EA,EA,EA,EA,A2,19,BD,3A,19,95,1F,CA,D0,F8,60,00,00,00,15,00
340 DATA00,00,1B,00,1B,D7,2B,01,FE,D8,D6,29,27,00,E8,83,00,15,00,00
350 DATAEA,EA,EA,EA,EA,EA,EA,EA,EA,EA,EA,EA,EA,EA,EA,EA,EA,EA,EA,EA,EA,EA
360 DATAEA,EA,EA,EA,EA,EA,20,A6,19,B1,26,D0,06,A9,20,91,20,D0,04,A9,51,91,20,20
370 DATA BD,19,F0,ED,20,A6,19,60,20,A6,19,B1,20,C9,51,F0,06,A9,00,91,26,F0
380 DATA04,A9,01,91,26,20,BD,19,F0,EB,20,A6,19,60,A9,00,AA,A8,85,20,85,26,85
390 DATA39,A5,25,85,21,A5,29,85,27,A5,36,85,3A,60,E6,26,E6,20,E6,39,E8,E4
400 DATA33,F0,0C,E0,00,D0,0E,E6,27,E6,21,E6,3A,D0,06,A5,34,C5,21,F0,03,A9,00
410 DATA 60,A9,01,60,EA,EA,EA,EA,EA,EA,EA,20,A6,19,B1,26,D0,06,A9,20,91,39,D0
420 DATA04,A9,51,91,39,20,BD,19,F0,ED,20,A6,19,60,20,A6,19,20,2F,1A,B1,39,C9
430 DATA51,F0,0C,A5,32,C9,03,D0,14,A9,01,91,26,D0,0E,A5,32,C9,03,F0,08,C9,02
440 DATAF0,04,A9,00,91,26,20,BD,19,F0,D8,20,A6,19,60,98,48,8A,48,A0,00,84,32
450 DATAA2,08,B5,29,10,15,49,FF,85,37,38,A5,39,E5,37,85,22,A5,3A,85,23,B0,11
460 DATAC6,23,D0,0D,18,65,39,85,22,A5,3A,85,23,90,02,E6,23,B1,22,C9,51,D0,02
470 DATAE6,32,CA,D0,CF,68,AA,68,A8,60,*
```

Cont'd...

2. To input data in BASIC without returning to BASIC command mode on receipt of a null string then an input statement can be simulated by a GET loop which contains additional statements to cope with DEL codes. This has the additional advantage that if there is a displayed frame on screen the frame characters will not be accepted as part of the input.

The attached listing shows the above routine. This starts at line 9000 and to use it, instead of INPUT A\$ you put GOSUB 9000:A\$=IN\$.

```

8000 REM SUBROUTINE TO SIMULATE NON-PET      STANDARD INPUT STATEMENT
8010 REM STANDARD INPUT DOES NOT BREAK      ON RECEIPT OF A NULL STRING
8020 REM "TINPUT" COULD BE ALSO BE          SIMULATED EASILY
8030 REM ZA$ IS DEFINED IN LINE 10
9000 IN$="":PRINT " ? ";
9010 GOSUB9070:PRINTZA$(ZB):IFZ$=""THEN9010
9020 IFZ$=CHR$(13)THENPRINT" ":RETURN
9030 IFZ$=CHR$(20)THENONSGN(LEN(IN$))+1GOTO9010,9060
9040 PRINTZ$:IN$=IN$+Z$:GOTO9010
9060 PRINTZ$:IN$=MID$(IN$,1,LEN(IN$)-1):GOTO9010
9070 ZB=1+(ZB=1):FORZA=1TO60:GETZ$:IFZ$<>" "THENRETURN
9080 NEXT:RETURN

```

3. I have found an error in the Disassembler programme. Line 2710 should read
, not 102 as at present.

* * * * *

QUOTE:

"Is buying a PET like buying a PEEK in a POKE?"

DAVID HALSTEAD

Petsoft

MICROCOMPUTER SOFTWARE
PO Box 9, Newbury, Berks. RG13 1PB
Tel. 0635-201131 01-352 1100 Telex 8951672

PETSOFT have just published a new catalogue of over 70 programs for the PET. If you would like to receive free copies of this and future issues, send an SAE to the address above.

Telephone orders are accepted for Barclaycard, Access, Eurocard, Mastercharge on 0635-201131. Otherwise cheque with order please.

Here is a selection of our new titles:-

ADDRESSBOOK £6

Stores names and addresses and telephone numbers as files in RAM, giving split second access to the information you need. Easy to adapt. PET users with large address books may require additional memory.

CURRENT ACCOUNT £15

Designed to keep records of the users current account. Deposit records are kept in three categories, salary and wages, other income, and deposits-not income. Withdrawal records are in eighteen different categories. In addition the program keeps a running total of deposits-income, deposits-other withdrawals-tax deductible, total withdrawals, and the current bank balance. This program accumulates all deposits, deducts all withdrawals and displays current balance. Complete financial details of any category may be recalled and displayed. Handles 146 data entries per tape. Includes documentation, master and demonstration programs. Documentation available separately price £1 post free.

GENERAL LEDGER £25

A simple effective accounting system for small businesses. Cashflow in and out of the bank account is divided into categories that can be recalled in seconds. Multi report with 8 types of deposits, 27 types of expenses, sub-accounts accumulated, grand totals including income, expenses, current bank balance. Holds up to 100 data lines when maximum data line capacity is reached, another block of memory may be started using new tapes. Provision to carry over to the new records the figures for bank balance - start of period, withdrawals-not expense, expenses, deposits made, and total income, for continuity. Includes full documentation, main program and demonstration program. Documentation available separately price £1 post free.

PROFESSIONAL/LEGAL DIARY £20

For solicitors, accountants etc. -by clients; accumulates hours, expenses, amounts billed, amounts received, balance owed by each client. Also keeps a running account on the grand totals for these accounts. Includes documentation, master and demonstration programs. Documentation available separately price £1 post free.

PORTFOLIO £8

Well written investment reporting program. Requests current price, compared to purchase price, prepares valuation; analyses net income by security and by month. Easily adapted.

STOCK CONTROL £12

Data stored under stock number, description, suppliers name and address, number in stock; can handle up to 255 product lines. Because requirements vary, this program sets out to provide a basic structure which may be added to as necessary. Written in BASIC.

Petsoft

MICROCOMPUTER SOFTWARE

PO Box 9, Newbury, Berks. RG13 1PB

Tel. 0635-201131 01-352 1100 Telex 8951672

RENT ACCOUNTS £20

Keeps detailed financial records of each rented property, and running grand total of major account totals. Five accounts are kept with complete details on each property: rent deposits, rents received, payments made to owner, expenses (charged to that property) and advance remaining in account. Complete financial details on a particular property can be recalled in seconds, as well as running grand totals. Holds up to 200 data lines before new memory tape required. Ideal for owners of rented property and estate agents. Includes documentation, master and demonstration programs. Documentation available separately price £1 post free.

TRUST ACCOUNTS £20

For solicitors and trustees -by clients; accumulates money amounts received, paid out, balance in account for each client. Also keeps running totals on amounts received, paid out and total balance in the trust accounts.

WORD PROCESSING I £12

Text may be entered as on a typewriter (shift for caps; lower case unshifted) edited, stored in data files and read back as required. A basic program adaptable for different printers.

AUTOGRAPH £7

Plots the graph of an algebraic function with one unknown determining correct scale, properly spacing and labelling the axes; will replot with different maximum and minimum. Second and third harmonics or varying percentage and phase displacement can be shown.

FREEHAND £5

Use the screen and a sketchpad without worrying about cursor or return keys. Complex life drawings can be made using just the key pad and saved by typing 'S' incorporates plot function.

ASSEMBLER/EDITOR Special Offer Price £25

The essential companion to anyone whose interest extends beyond BASIC. Package contains one and two pass assemblers for assembling machine code programs, text editor for preparing larger assembly language source programs for the assembler, and executor/disassembler for executing machine language programs assembled into memory. Plus full documentation. Send an SAE for free data sheet or £2 (refundable on order) for full documentation.

BASIC RENUMBER Special Offer Price £20

This routine renumbers the lines in your basic programs in increments of 10, altering GOTO and GOSUB to match. Send an SAE for free data sheet.

FORMAT £8

Allows you to avoid all those infuriating decimal places PET prints when giving numerical results, by controlling exactly how many digits will appear. Three programs including tutorial with working demonstrations of programs in action. The routine itself occupies just over 500 bytes, and can be included in your own programs as a sub-routine.

CASSETTE FILING £8

Comprehensive tutorial explains and demonstrates correct use of data files; includes patches for bugs in PET's file handling system.

Petsoft

MICROCOMPUTER SOFTWARE
PO Box 9, Newbury, Berks. RG13 1PB
Tel. 0635-201131 01-352 1100 Telex 8951672

LINK £10

An essential software tool which merges two or more programs into one. Just load and run. Can also be used with Basic Renumber.

MUSIC £10

This program plays music via amplifier and speaker connected to user port (or via radio placed near it!) The music to be played is encoded as data statements. The method is detailed in documentation and five example tunes are included. Documentation available separately price £1 post free.

OVERLAYS £8

Essential tutorial suite shows how to overcome the 8K memory limitation by appending one program to another, transferring subroutines and whole sections of programs. Includes working examples.

PEEK & POKE £5

Well written tutorial program introduces two of PET's most useful commands. Displays every single character inside PET with its PEEK/POKE number; explains how to poke lower case characters onto the screen.

BACKGAMMON £8

Although not yet up to international standards this game is a real pleasure to play. Superlative graphics. PET shakes the dice and moves the men on your instructions. If you get fed up playing the computer, PET will play itself, which is as good a way to learn as any.

CIVIL WAR £7.50

Developed from the computerised war games played at the Pentagon, this sophisticated program lets you re-fight the English civil war. By sending out scouts, carefully manoeuvring your different forces, and by dispatching reinforcements to weak counties prior to attack, you may be able to control the whole country. Good battle commentary. We think this program is superb. Takes 45 minutes plus to play.

SALES ANALYSIS £10

Handles up to 10 salesmen selling for 4 divisions over 12 months and prints bar charts for analysis. Minimum plot value is £1,000 on a scale to £32,000; maximum plot value is £511000 month/salesmen/division. These parameters can easily be changed.

Plus over 40 more titles in the new catalogue. Send an SAE for a free copy. PETSOFT is not a Commodore company.